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## PATENT SPECIFICATION

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## PROVISIONAL SPECIFICATION

## Improvements relating to Electric Switch Contact Mechanisms

We, ROTAX LIMITED, a British Company, of Rotax Works, Victoria Road, Willesden Junction, London, N.W.10, do hereby declare the nature of this invention to be as follows:—

This invention relates to electric switches, and particularly electromagnetically actuated switches, of the kind in which a movable contact member is operable in a direction at right angles to itself for co-operating with a fixed contact or contacts. The object of the invention is to enable a wiping action to be set up between the fixed and movable contacts transversely to the direction of the closing movement after the contacts have been brought together.

The invention comprises the combination of a rigid member carrying the movable contact piece or pieces, an actuating member at right angles to the contact member, and interconnecting means such that a small continued movement of the actuating member after the fixed and movable contact pieces have been brought together causes the contact member to move transversely to the actuating member.

In one embodiment of the invention we employ a movable contact member in the form of a short rigid bar having a contact piece at each end. To the centre of this bar is connected an actuating member which is at right angles to the contact member and serves as or is attached to the core of a solenoid. The connection between the two members is effected by a shackle which is attached to the actuating member and which embraces the contact member. The latter is connected to the shackle by lateral projections from its edges which engage a pair of inclined slots formed in the opposite sides of the shackle. The projections may be integral with the contact member, or they may be formed by a pin secured transversely across the said member. Also the contact member

is loaded by a spring arranged in the shackle.

The contact pieces on the movable contact member are arranged to co-operate with complementary fixed contact pieces. When the solenoid is excited it moves the actuating member in the direction for advancing the movable contact member towards the fixed contact pieces. When the movable contact pieces are arrested by abutment against the fixed contact pieces, a small continued movement of the actuating member causes relative movement between the shackle and the movable contact member and by the interaction of the said inclined slots and projections there results a movement of the movable contact member in the direction of its length, thereby giving the desired wiping action between the fixed and movable contact pieces, this action serving to maintain the contiguous surfaces of the contact pieces in good working condition. On the return movement of the actuating member, the movable contact member resumes its original position relatively to the shackle under the action of the associated spring.

The invention as exemplified in the foregoing description is capable of being embodied in a variety of forms suited to different requirements. Thus in a double acting switch two movable contact members may be arranged parallel with each other and as above described in the same shackle. Also two pairs of fixed contact pieces are provided. In one position of the actuating member one pair of fixed contact pieces are bridged by one of the movable contact members. On moving the actuating member to its other position the previously operative contact pieces are separated, and the other movable contact member is caused to bridge the other pair of fixed contact pieces. When either pair of fixed contact pieces is bridged, its associated movable contact member

receives a wiping movement as above described.

It is not essential to provide a pair of contact pieces on the movable contact member, or each of them, as for some purposes a single contact piece only is required. Moreover, the actuating member is not necessarily operated by an

electromagnet, as other actuating means may be used. Also other subordinate details may be varied to suit different requirements.

Dated this 10th day of June, 1948.

MARKS & CLERK.

## COMPLETE SPECIFICATION

### Improvements relating to Electric Switch Contact Mechanisms

We, ROTAX LIMITED, a British Company, of Rotax Works, Victoria Road, Willesden Junction, London, N.W.10, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to electric switches, and particularly electromagnetically actuated switches, of the kind in which a movable contact member is operable in a direction at right angles to itself for co-operating with a fixed contact member or members. The object of the invention is to enable a wiping action to be set up between the fixed and movable contacts transversely to the direction of the closing movement after the contacts have been brought together.

The invention comprises the combination of an actuating member, at least one movable contact member carried by and movable relatively to the actuating member, a spring-loaded pin and inclined slot connection between the actuating member and movable contact member, and a stationary contact member, the arrangement being such that a small continued movement of the actuating member after the movable and stationary contact members have been brought together causes the movable contact member to move transversely to the stationary contact member.

In the accompanying drawings:

Figures 1 and 2 are respectively sectional front and side elevations illustrating one embodiment of the invention.

Referring to the drawings, these show a switch in which are provided three upper pairs of stationary contact pieces *a*, and three lower pairs of stationary contact pieces *b*. Between them are arranged three pairs of rigid movable contact members *c*, *d*, each provided at their ends with contact pieces *e*, *f*, adapted to co-operate with the stationary contact pieces *a*, *b*. The members *c*, *d*, in each pair consist of short rigid metal bars, these being arranged parallel with each other at a convenient

distance apart as shown in Figure 1. The movable contact members *c*, *d*, are inserted laterally through a rigid hollow actuating member *g* disposed transversely to and at the centre of the members *c*, *d*. The member *g* is formed (as shown in Figure 2) with three cells through which the pairs of members *c*, *d*, are inserted.

The actuating member *g* is anchored by a pivot pin *h* to the lower end of the plunger *i* of a solenoid *j*, and is guided by a pair of rods *k*, carrying springs *m* which serve to move the member *g* in the opposite direction to the movement imparted by the plunger *i*. The attachment of the member *g* to the pivot pin *h* is effected by a pair of metal strips *n*, *o*. The strip *n* is secured to the member *g* and is bent to form a loop through which the pin can be inserted. The strip *o* is of spring form and is adapted to bear at its ends on the upper side of the member *g*, its middle part being shaped to bear against the underside of the pin *h*.

The solenoid is mounted on a carrier plate *p* to which are also attached the contact pieces *a* and the upper ends of the guide rods *k*. The other contact pieces *b* are mounted on any convenient part of the switch structure.

Within each of the cells in the actuating member *g*, is arranged a shackle *q*, made from a metal strip bent to a U-form and having in each of its sides a pair of inclined slots *r*. Transversely through the centre of each member (*c*, *d*) is inserted a pin (*s*) the ends of which can engage the adjacent slots in the shackle. Alternatively lateral projections may be formed integrally with the side edges of the members *c*, *d*, for engagement with the slots. Also a spring *t* is provided between each pair of members *c*, *d*.

The arrangement is such that when by movement of the plunger *i* under the action of the solenoid *j*, the contact pieces *e* of the members *c* are moved into contact with the stationary contact pieces *a*, a small continued movement of the plunger causes the members *c* to move horizontally by the interaction of the pins

s and the slots r, thus effecting a wiping action between the surfaces of the parts a, c. Likewise when the member g returns under the pressure of the springs m, the contact pieces f of the members d are pressed against the lower contact pieces b, with a wiping action.

The invention is capable of being embodied in a variety of forms, of which the foregoing is one example. Thus the number of movable and stationary contact members may be varied, and instead of employing a solenoid and springs for moving the actuating member, any other appropriate means may be used.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An electric switch of the kind specified comprising the combination of an actuating member, at least one movable contact member carried by and movable relatively to the actuating member, a spring-loaded pin and inclined slot connection between the actuating member and movable contact member, and a stationary contact member, the arrangement being such that a small continued movement of the actuating member after the movable and stationary contact members have been brought together causes the movable

contact member to move transversely to the stationary contact member. 35

2. In a switch as claimed in Claim 1, the combination of an actuating member, at least one pair of movable contact members mounted parallel with each other and carried by the actuating member, and a spring-loaded pin and inclined slot connection between each contact member and the actuating member. 40

3. A switch as claimed in Claim 1, and comprising the combination of a plurality of pairs of movable contact members, the members in each pair being arranged parallel with each other, complementary stationary contact members, an actuating member carrying and arranged transversely to the movable contact members, a pin and inclined slot connection between each movable contact member and the actuating member, a spring between each pair of movable contact members, a solenoid for moving the actuating member in one direction, and spring means for moving the actuating member in the opposite direction. 45

4. An electric switch comprising the combination and arrangement of parts, substantially as described and as exemplified by the accompanying drawings. 50

Dated this 20th day of April, 1949.  
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[This Drawing is a reproduction of the Original on a reduced scale.]

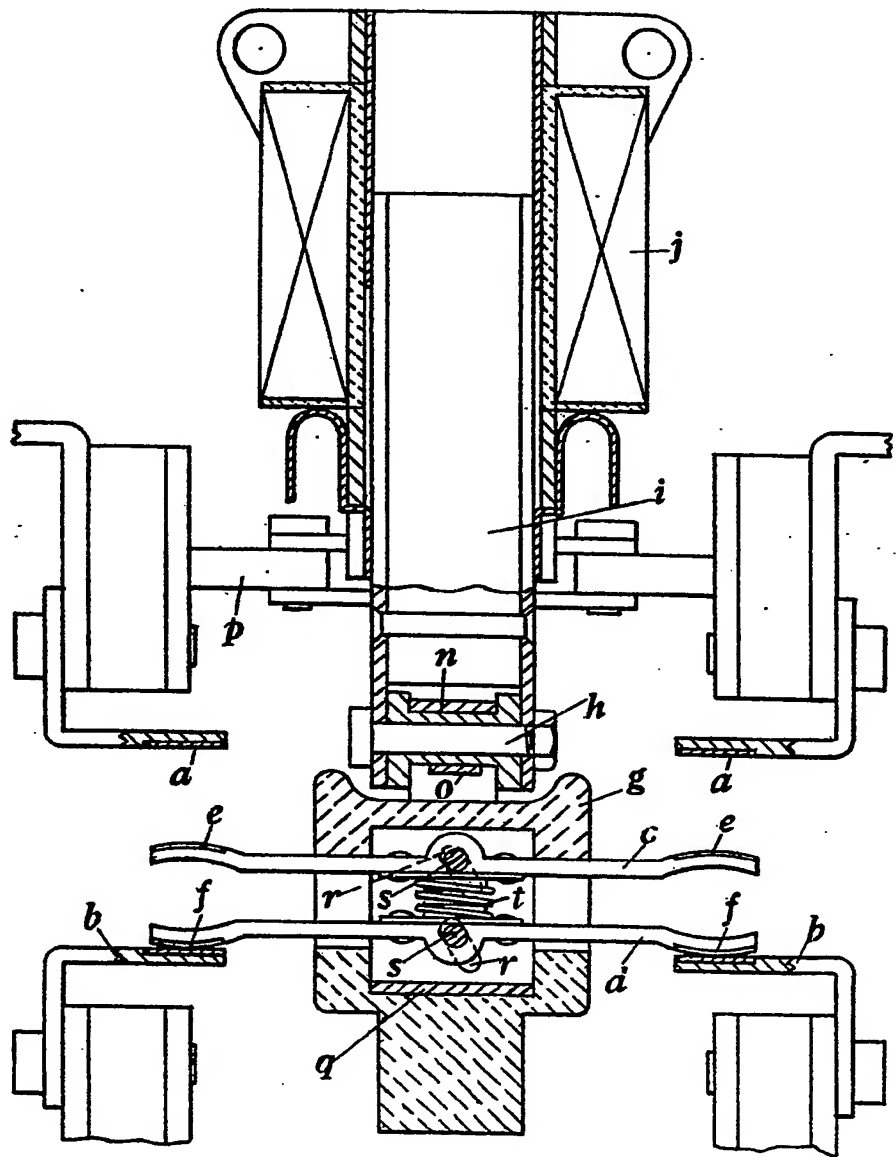
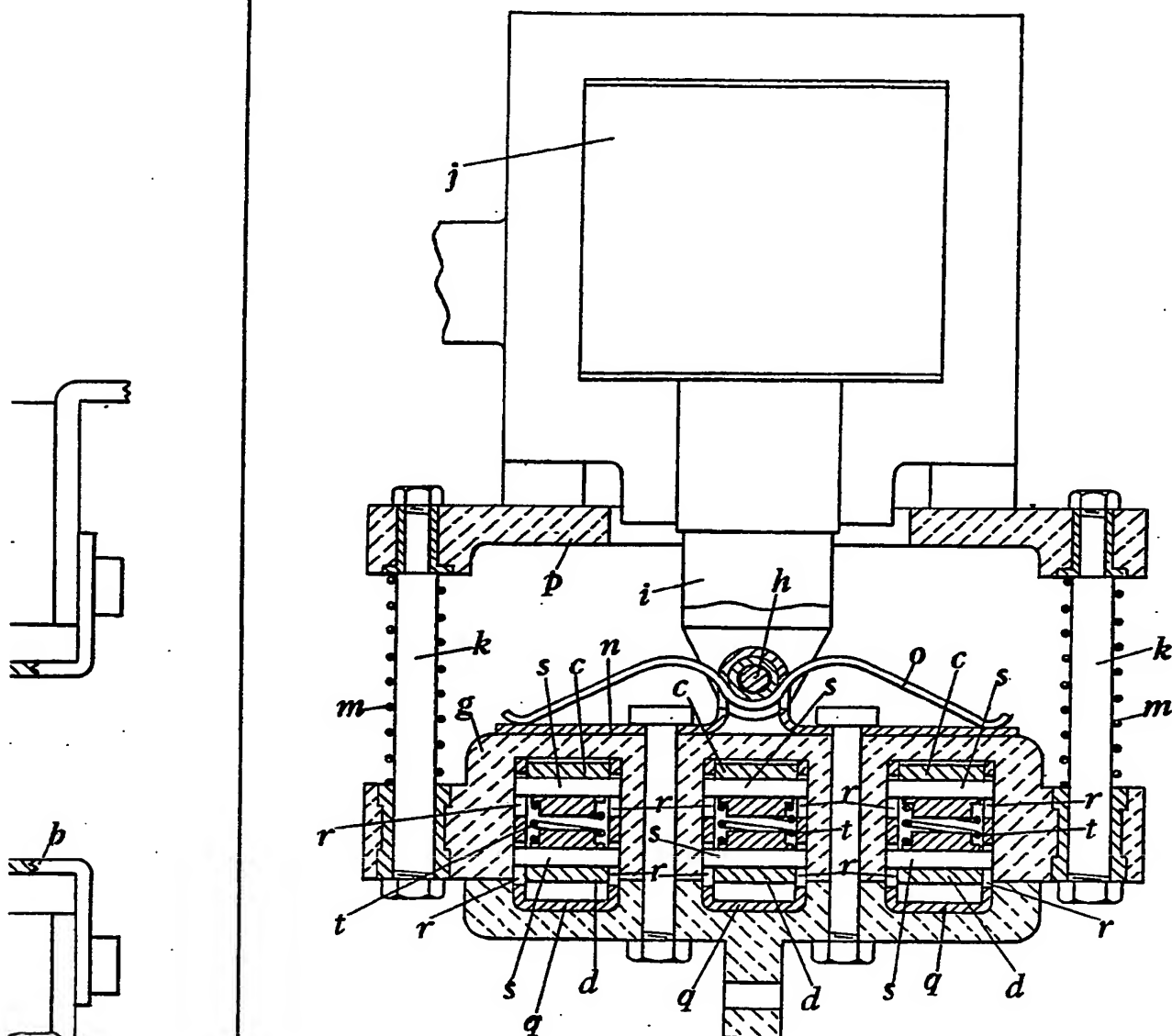


Fig.1



**Fig.2**

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SHEET 1

SHEETS  
SHEET 2

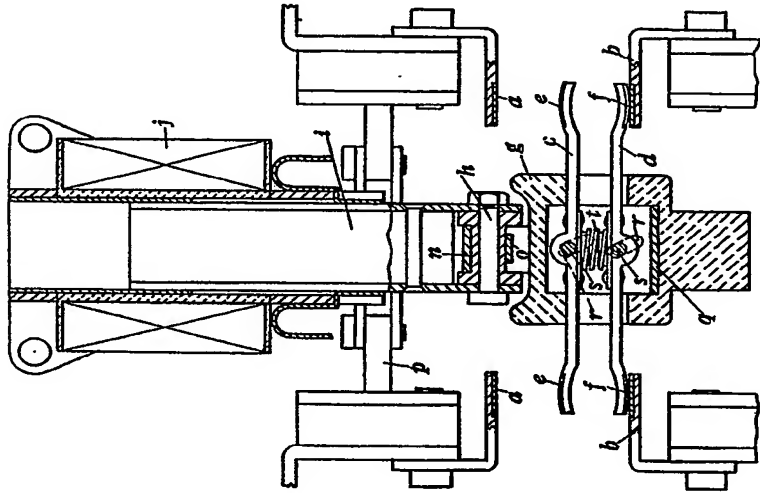


Fig. 1

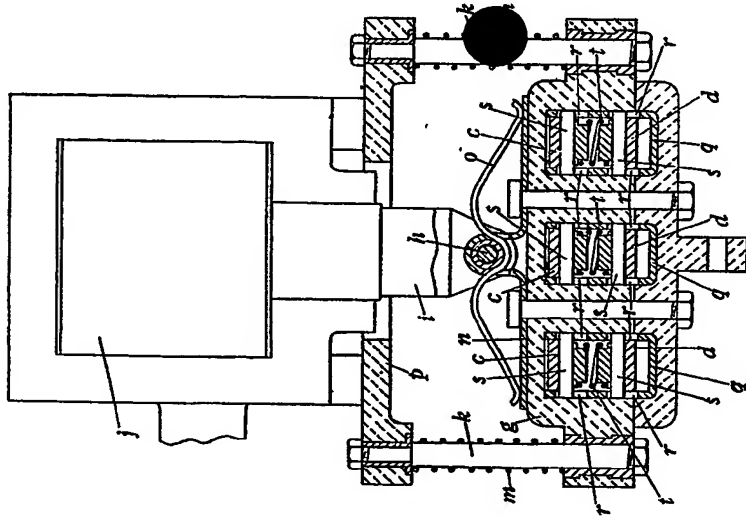


Fig. 2

[This Drawing is a reproduction of the Original on a reduced scale]